# Achieving Sensor-to-Shooter Synergy

by Lieutenant Colonel Frank J. Caravella, US Army, Retired

*From the earliest times through World War I, battles and wars were directed against people. The focus of effort was on killing enemy forces until the opposition withdrew or surrendered. Beginning with World War II and continuing through the Persian Gulf War, the main goal of battle made a transition from destroying people to destroying war machines. Tanks, airplanes, artillery, armored personnel carriers, air defense weapons and surface-to-surface missiles have been the prime objectives against which firepower is planned and directed. Now, however, there is a new era emerging—information. Information is the key to successful military operations; strategically, operationally, tactically and technically. From war to operations other than war, the adversary who wins the information war prevails.*

— General Glenn K. Otis, US Army, Retired
*Information Campaigns*, 1991

RETIRED GENERAL Glenn K. Otis and other leading military prognosticators have stated that information is the new high ground on the 21st-century battlefield . . . and that the next century's land component commander (LCC) requires timely and accurate information to reduce the ever-quickening decision cycle. However, with myriad information sources on the joint battlefield, how can the sensors and collectors be controlled to respond to the commander's battlefield requirements? Specifically, how can the LCC achieve the "sensor-to-shooter" synergy prophesied in so many military documents?

To achieve sensor-to-shooter synergy early in the 21st century, a new organization is required at the Combined Joint Forces Command (CJFC) and LCC headquarters to manage the collection, processing and responsiveness demanded by the dynamic information-age battlefield. Only then can the CJFC achieve battlespace domination.

To illustrate this point, I have rewritten an excerpt from my July-August 1997 *Military Review* article:

**The enemy forces were alert, well armed and ready. New training technologies, long-range, precision antitank (AT) weapons and specially armored tanks had given them confidence. The defending commander waited patiently for the word from his air and ground reconnaissance teams. He understood the US doctrine and its emphasis on striking deep and fast. To thwart the American attack, all he needed to know was when and where to react. His reconnaissance teams would tell him when the Americans reached division ballistic missile and field artillery range. The artillery attack should slow the Americans' advance and drive them into an adjacent valley. His reaction forces, hiding in defilade, would attack—killing as many Americans as possible.**

**The American task force rolled across the terrain. Movement was coordinated instantaneously between vehicles through automatic exchange of digital information. The Joint Stars Moving Target Indicator (J-STARS MTI) data, integrated into the commander's tactical terminal, provided movement data on both friendly and enemy vehicles. However, even with known enemy dispositions, the enemy's reaction to his maneuver was still in question.**

**Above the attack force circled two unmanned aerial vehicles (UAVs), providing real-time targeting, adjustment of fire and battle damage assessment. However, a third UAV entered the airspace, confusing the task force (TF) commander. A symbol on his display designated the third UAV as hostile. An Avenger fire unit, with its "slew-to-cue" capability, received the hostile indication from the Forward Area Air Defense data network and locked on the enemy**

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**The ISR process is about gathering, processing and disseminating information. The goal is to collect and package all relevant data needed by a decision maker at the time he needs it. This function would best be executed during operations by locating an ISRC at both the CJFC and LCC headquarters. The ISRC would be integrated into the operations management process and under operational control of the operations section. The main ISRC focus would be to process and share intelligence data better and quicker.**

reconnaissance aircraft with a Stinger missile. Within seconds the enemy UAV lay in flames. However, the TF commander knew he had lost the element of surprise.

Enemy artillery erupted and landed on and near his forces. Friendly intelligence had been wrong. Somehow the enemy had hidden capability from friendly overhead sensors. His right flank vehicles entered a mine field, so he shifted the attacking forces into a valley where the hills would mask their positions. He would then move in behind the enemy force and attack from a direction where the enemy's defenses were weaker. However, after entering the valley, a few armored vehicles dropped into hidden tank ditches, slowing the task force's advance. The enemy artillery continued unabated.

Using a video teleconference on his workstation, the TF commander called back to the LCC headquarters and said, "Raven 47, this is Blackjack 6. Enemy artillery and ballistic missiles slowing our advance. Counterfire ineffective. Need help finding enemy locations. Also request close air support (CAS)."

"Roger, Blackjack 6. Standby." Raven 47 clicked on his workstation and said, "Birdseye 35, did you copy?"

"Roger, Raven. Have an IR-imaging UAV and national satellites available. Will retask immediately."

On the battlefield display inside the Intelligence, Surveillance and Reconnaissance Cell (ISRC), the ISRC director, Birdseye 35, brought up the latest satellite IR imagery of the enemy's positions. The enemy forces had hidden their positions well from the overhead surveillance platforms, but the attack had exposed the enemy's multiple and hardened locations. The US Air Force's high-altitude UAV had reached a position where it could delineate the individual firing positions. The ISRC director froze a frame from the real-time UAV video on the computer. Using the graphics software, he annotated the enemy and friendly unit positions. He pushed a "send" button to relay the picture to the ready display in the Blackjack commander's tactical terminal as well as the cockpit display of the supporting CAS aircraft.

**At the same moment, the J-STARS MTI picked up movement in Blackjack's rear. Several bright symbols began moving along a road toward the attacking and vulnerable ground force. The TF commander directed a UAV to that area to help identify the moving vehicles. Apparently, the enemy's reaction force had been held in defilade but was now accurately located by the UAV. The commander switched to his recognized air picture (RAP) display and contacted his attack helicopters waiting in a "hide" position. He froze the UAV picture and sent it to the helicopter cockpit displays and directed an attack on the enemy reaction force. The helicopters struck with relentless, unforgiving lethality. Within minutes, the reaction force littered the roadway. The momentum had shifted, and the commander focused on his next objectives—silencing the enemy artillery and destroying the defending force. With the imagery and UAV video provided by the ISRC, he could now direct his attack assets onto the appropriate targets.**

## Defining the "Sensor-to-Shooter" Link

A fundamental difference between 20th-century and 21st-century operational requirements relates to the speed, correlation and varied presentation of the battlefield situation. Tomorrow's knowledge requirement focuses on shortening the decision cycle to such an extent that the only limitations should be the laws of physics—that is the delivery time of the attack assets.

The timing of 21st-century operations will be driven by the joint decision cycle depicted in Figure 1. The joint decision cycle operates on a graduated scale from minutes to hours to days. The exact joint decision cycle will be influenced by specific mission tasks, the need for operational flexibility and the requirement to thwart the enemy's decision cycle.

To operate on a reduced decision cycle, the CJFC must be organized to conduct knowledge-based

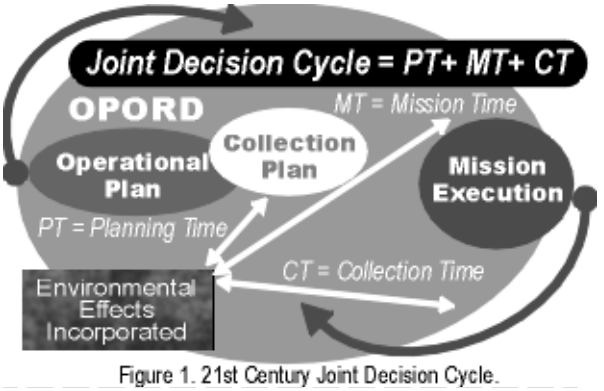


Figure 1. 21st Century Joint Decision Cycle.

**Information barriers that break down the planning, collection and execution processes must be eliminated, both functionally and technically. Melding the operational and collection plans prior to execution is particularly important. The collection planning is the basis for all decisions covering the allocation of ISR resources in both the deliberate planning and dynamic retasking processes.**

operations. This means those information barriers that break down the planning, collection and execution processes must be eliminated, both functionally and technically. Melding the operational and collection plans prior to execution is particularly important. The collection planning is the basis for all decisions covering the allocation of ISR resources in both the deliberate planning and dynamic retasking processes. *This is the sensor-to-shooter link*. The truth is that if collection planning is done poorly, dynamic retasking will also be done poorly.

## Controlling the Sensor-to-Shooter Links

Over the past 10 years, the ISR community has seen dramatic growth in real-time, high-altitude, long-endurance collectors. The high-endurance and real-time information capabilities provided by these platforms give the CJFC commander greater situational understanding, which is necessary to make rapid and effective decisions. But even with the recent advances in sensor capabilities, the national community, joint services and allies operate myriad collection platforms and assets that vary widely in their capabilities and employment concepts. Controlling and directing these assets is essential to meeting 21st-century battlefield challenges.

The ISR process is about gathering, processing and disseminating information. The goal is to collect and package all relevant data needed by a decision maker at the time he needs it. This function would best be executed during operations by locating an ISRC at both the CJFC (primary location) and LCC headquarters (secondary location). The ISRC would be integrated into the operations management process and under operational control of the operations section. The main ISRC focus would be to process and share intelligence data better and quicker as illustrated in Figure 2.

The ISRC would provide huge payoffs for any commander because the ISR process can finally affect operations in real time through true operations/

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intelligence integration. This capability provides forces with unprecedented situational understanding and the ability to operate within an adversary's decision cycle to achieve surprise, paralyze the enemy and minimize friendly losses.

This ISRC mission would be to "manage the ISR process . . . from requirement to collection to satisfaction." This statement must not be interpreted as the ISRC being the all-encompassing controller but rather an orchestrator. As shown in Figure 3, the ISRC is subordinate to the joint intelligence officer (J2), but opcon to the joint operations officer (J3) for dynamic retasking. This subordination is essential, since the J2 traditionally controls all aspects of the collection management process and is fully cognizant of tactical and strategic requirements and the collection planning procedures.

It is also important to emphasize that the ISRC's purpose is not to replace existing J2 or J3 functions. Rather, the ISRC functions are complementary to both the intelligence and operations functions. For example, in a rapid targeting scenario, a target of opportunity is identified. The J2 targets' section will research all available target data. The ISRC's role would be to transmit the imagery and data to the appropriate shooters. Similarly, an intelligence analyst assigned to the ISRC would perform basic threat analysis to support time-sensitive changes to sensor locations and taskings. In-depth analysis of historical threat activity remains with the traditional J2.

The ISRC organizational components include:

- Collection coordination intelligence requirements management (CCIRM) for requirements and collection management.
- Tactical reconnaissance cell to task ISR platforms.
- Signals Intelligence Reconnaissance Cell to task electronic warfare assets.
- National Collection Management Cell to task US national assets under CJTF control.
- ISR-specific platform or assets unit personnel to provide system expertise.
- Special liaisons, like Special Operations Forces.
- Dynamic Tasking Cell (DTC) to retask platforms or assets.
- Systems integrator to manage the display and transfer of varied information, including data, imagery and video.

**Deliberate planning.** The CCIRM provides the foundation for the planning process, as it manages a requirement's process and interacts with all the other ISRC functional areas. Routine requests for information (RFIs) normally process through the deliberate planning cycle. This procedure includes representatives from all ISRC functional elements to determine the best available collection platform, sensor and method to satisfy the requirement. Once chosen, the elements maintaining control over the asset start the tasking process by notifying the plans staff for tasking. The tasking process also includes a daily director's ISR coordination meeting, which includes delegates from all ISRC functional ele-

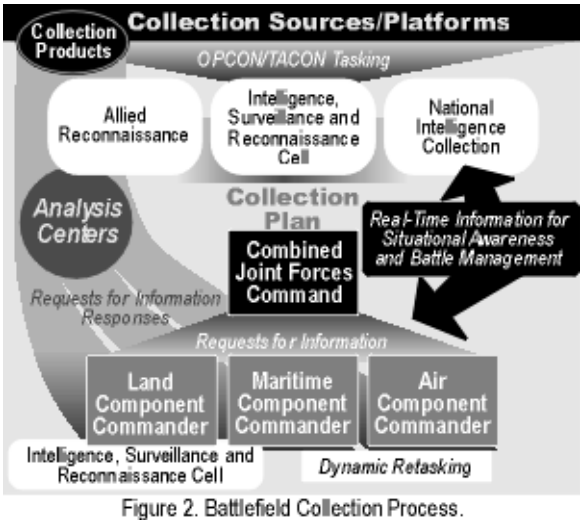

Figure 2. Battlefield Collection Process.

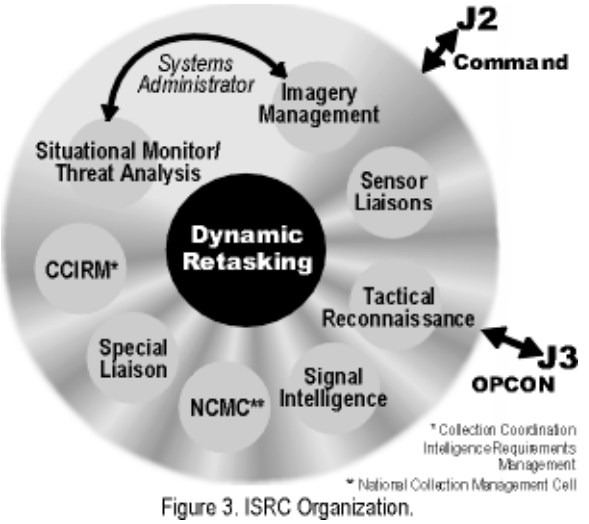

Figure 3. ISRC Organization.

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**Who . . . is charged to define and respond to the CJFC and LCC 21st-century collection requirements? . . . The intelligence community is the wrong community to *lead* the effort. Commanders, specifically the LCC, should drive collection requirements in the joint community. The LCC should define and organize his information warfare headquarters in a manner that breaks down the barriers between the intelligence and operations communities. The ISRC breaches intelligence and operations, supports synchronization between the services and designates an organization with the specific mission to respond to the 21st-century LCC near-term collection requirements.**

ments. During this meeting, the CCIRM provides a listing of all current RFIs. Next, adjustments to the planned taskings are made in response to urgent requests from different agencies, primarily the LCC headquarters. Functional area representatives review the current list and make any adjustments to their taskings. Figure 4 illustrates the actual collection tasking flow.

**Dynamic tasking.** When an RFI requires immediate action, it processes through the dynamic tasking cycle. This process uses "skip-echelon," whereby the RFI passes directly to the ISRC DTC for retasking of a collection platform. The ISRC DTC's ability to perform its mission depends on good information. Figure 5 depicts the information categories needed to effectively task assets. Current situational understanding is important to know what is happening in the battlespace. The ISRC must have the same near real-time displays used by the operations staff, as well as inputs from active sensors.

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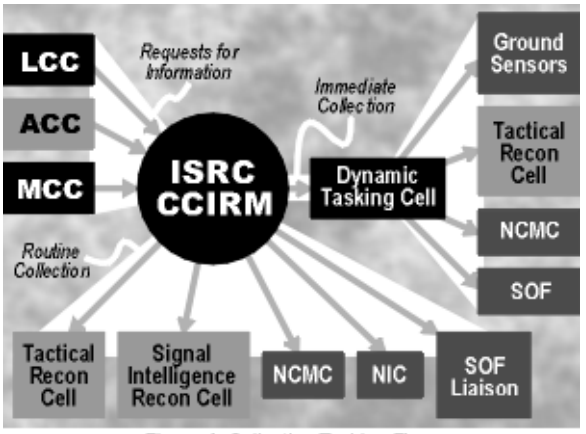


Figure 4. Collection Tasking Flow.

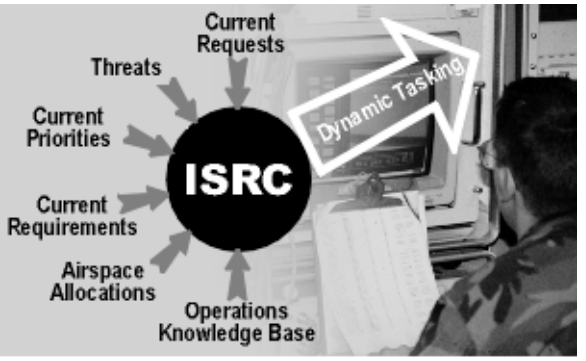


Figure 5. ISRC Information Flow.

**During dynamic tasking situations, the ISRC provides timely response to customers' requests. Requesters whose lower-priority tasks are dropped from the current task list are also notified.. . . . The subordinate ground elements send their validated, prioritized requirements forward for satisfaction by ISR assets. The CJFC ISRC cell is in constant contact with the land force's ISRC cell to clarify requirements, explain collection priorities and provide the tentative tasking schedule.**

Requesters whose lower-priority tasks are dropped from the current task list are also notified. Land forces are the primary source of RFI requirements for both deliberate planning and dynamic tasking. The subordinate ground elements send their validated, prioritized requirements forward for satisfaction by ISR assets. The CJFC ISRC cell is in constant contact with the land force's ISRC cell to clarify requirements, explain collection priorities and provide the tentative tasking schedule.

**Technical expertise.** The capability to effectively and efficiently employ sensor assets is extremely dependent on technical sensor and platform expertise. However, new computer software allows geographical visualization of sensor footprints and correlation of sensor capabilities, giving more personnel the "technical capability." Moreover, it is anticipated that newer software applications will allow the ISRC to view the potential of multiple sensors working in concert. This capability would put the ISRC in a better position to manage combined sensor suites. The capability's development is fundamental to the ISRC concept. Ultimately, the goal is to maximize the technical experts' strengths and the available/emerging tools to provide a flawless sensor-tasking mechanism.

Finally, the ISRC cannot be a single-point failure in the information network. There should be enough redundancy built into the technology and communications so that secondary and tertiary organizations would assume the ISRC mission if it were rendered inoperational. All security measures must be taken to ensure friendly information is protected from exploitation or disruption.

## Why a New Organization?

The intelligence community and those people involved in the Joint Precision Strike Demonstration (JPSD) have every right to question the necessity of a new organization to manage the sensor-to-shooter links. My response is simple. JPSD did find near-term solutions to some difficult sensor-to-shooter issues, and yes, the intelligence community is working toward the goal of sensor-to-shooter synergy. Who, however, is charged to define and respond to the CJFC and LCC 21st-century collection requirements? Who is looking at the joint and coalition battlefield? Who acts as the bridge between the J2 and J3 and is charged with reducing the response time? I suggest that the intelligence community is the wrong community to *lead* the effort. Commanders, specifically the LCC, should drive collection requirements in the joint community. The LCC should define and organize his information warfare headquarters in a manner that breaks down the barriers between the intelligence and operations communities. The ISRC breaches intelligence and operations, supports synchronization between the services and designates an organization with the specific mission to respond to the 21st-century LCC near-term collection requirements.

The 21st-century battlespace threat will be more dynamic, projected, sophisticated and survivable. Friendly forces must control the battlespace by either denying or deterring any adversary offensive or defensive option. No single solution exists to counter the threat. Therefore, the 21st-century CJFCs and LCCs must synchronize operations to collect intelligence and command and control more effectively.

In the 21st century, information must be quickly collected, organized, analyzed and displayed in a form that enhances the military decision maker's knowledge and understanding of the rapidly evolving situation. Balancing the ever-quickening information-gathering cycle with the decision-making cycle will be one of our greatest challenges. Implementing the ISRC concept at the CJFC and LCC headquarters is the first step in achieving true 21st-century sensor-to-shooter synergy. ***MR***

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